CROP SCIENCE SOCIETY OF S.A. INCORPORATED

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INCORPORATING THE WEED SCIENCE SOCIETY
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Next Meeting **'Special Event – See Details Below'**

Venue **College Hall, Rosworthy Campus for dinner and later Stefanson Theatre for speakers**

Date **WEDNESDAY 15th February**

Time **6.30 pm (for dinner) – 9.30 pm**

You're invited to review the latest in cropping and livestock research

Join the Crop Science Society of SA to hear the results and outcomes of three years research, involving thousands of SA farmers, and what it means for the future productivity and profitability of South Australia's primary producers.

The first Crop Science meeting for 2012 features a special presentation on the future productivity and profitability of South Australia's primary producers.

- To be held on Wednesday 15th February at the University of Adelaide, Roseworthy Campus, the meeting will start with dinner (free of charge) at 6:30pm.
- Speaker presentations will begin at 7:30pm in the Richardson Theatre.
- All welcome!

RSVPs by February 10th are essential for the dinner but are not required for those attending the meeting only. Three course dinner provided, beverages available for purchase.

Please email your RSVP to: rsvp@seftonpr.com.au

Speakers

Nick Edwards SARDI – 'Reducing emissions from livestock research program'

Peter Hayman SARDI – 'Climate adaptations for cropping in SA'

Melissa Rebbeck SARDI- 'Climate adaptations for Southern livestock systems'

Sand Formations: Prepared for Agricultural Sciences Tour for 1st Year Students.

26th - 29th September, 2011.

Apart from the Southern Mt Lofty Ranges, the landscapes, and thereby the agricultural pursuits, in the regions through which this tour takes place are dominated by the sand formations. This paper briefly introduces the various forms of sand dunes which may be observed and which reflect the geological processes.

Underlying these formations are a series of ancient shorelines, the major one being the Naracoorte and Coonalpyn Ranges and their continuation as the Mamon-Jubuck range. On the southern side of which are the comparatively recent series of shorelines in the Upper South East which are a focal point on the first day. On the northern side are more ancient shorelines over which are the west/east longitudinal dunes in the agricultural areas have been formed in the Pinnaroo and Loxton regions. These are separated by the vast dune fields of Ngarkat (adjoining the Big Desert and Wyperfield Parks in Victoria) and Billiat (adjoining the Murray-Sunset reserves). [Further south of Bordertown is the Little Desert of Victoria and the Bangham Scrub].

1. **Dunes of agricultural origin.**
   Erosion, resulting from over cultivation, poor vegetative growth and, to some extent land clearing, resulted in very serious levels of erosion in the Murray Mallee in the general period from the 1920s to the 1970s but has been declining since especially with the adoption of direct drilling and related techniques. Many of the dunes have gradually reduced in height over the last 40 years so that most of the remaining dunes are in treelines and along roadsides.

These dunes are normally at right angles to the prevailing wind (ie north/south) and originate in the adjoining paddock. (Near Sanderson, NW of Mannum)

2. **Longitudinal Dunes formed during the recent Ice Ages.**
   Cold, dry windy conditions and sparse vegetative growth during ice ages result in sand being swept along in the direction of the prevailing winds to form longitudinal dunes which when destabilized more downwind. The actual direction of travel reflecting the summation of the wind's direction. The older dunes are red through the accumulation of Fe whereas younger dunes are white (Molineaux series).
   Dunes from south of Loxton near Wanbi.
   Note the uncleared dunes towards the south. Especially towards the east in the photograph the dunes have spread out over the landscape to form a sand plain. With good crops this sand is more or less stabilized and does not get swept back to the dune. In some areas, including Eyre Peninsula, there was a practice of destabilizing the dunes to allow them to spread over the heavier (more clay) flats resulting in more tractable agricultural soils

3. Parabolic dunes.
In regions of very large accumulations of sand, parabolic dunes are formed through the partial stabilization through (mallee) vegetation, moister conditions and the blowing out of dune peaks. The Photo comes from Ngarkat. Which also shows the fire pattern over the past few years.

4. **Jumbled dunes.**

These are not common in our areas, but there are some elements of these in the coastal dunes in the SE shorelines. These seemed to be common on the N coast of Denmark where the vegetative growth was on the top of the dunes where, presumably the salt had been leached, and further windblown sand was trapped by the vegetation.
Photograph from the Kapinnie region west of Cummins on Eyre Peninsula.

5. **Lunette**

These form on the downwind side of Playa Lakes (temporary lakes, often coastal which dry during the summer so the sand is blown to the lake margin forming a 'New Moon' dune on the leeward side. In arid circumstances the sand from the lunette is blown down wind to form a longitudinal dune.

Photograph from near Karkoo, lower Eyre Peninsula. Presumably the lake has contracted so the residual dunes from earlier periods are visible.

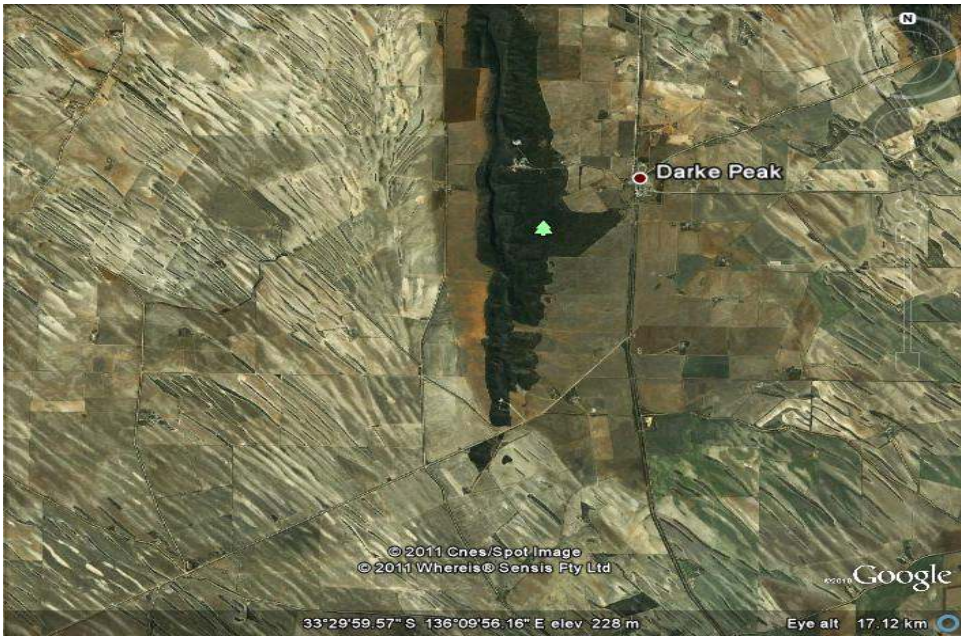
6. Coastal dunes

The most spectacular examples of these are the Coorong Dunes, especially on the coastal side which we will see on tour. The Google photograph is from near the Murray Mouth where a ready supply of sand is being blown into the Coorong.

7. Local factors

Local disruption of air movements can alter dune patterns. The photograph comes from Darke Peak on Eyre Peninsula.

Some sands are intensely erodible, including those at the base of Darke Peak. It had been drizzling and Peter Dunn, a local farmer, remarked that in half an hour dust would be blowing. To our surprise, he was correct. Similar highly erodible soils are to be found near Cooke Plains.



8. Older Shorelines

North of the Mamon-Jabuck range extending north of the Murray are a extensive series of older shorelines which can be seen on Google Earth in some areas. The photograph comes from west of Karoonda where the ancient lines run NW to SE with the recent dunes W to E.

Thanks to Drs R Twidale and J Bourne for their help and interest

Crop-topping pulses for late weed control

Michael Lines, Larn McMurray, Jenny Davidson (SARDI) and Jason Brand (DPI Vic).

Background

Crop-topping, the late application of a non-selective herbicide to prevent development of viable weed seeds, has become an important tool for managing weeds in pulses.

Pulse crops vary in their sensitivity to this practice, and it cannot always be used without influencing grain yield and quality. It is possible, however, that cultivars exist within each crop that are better suited to this practice.

Agronomy trials

Crop-topping trials have been conducted on four pulse crops across southern Australia from 2007 to 2011 as part of the GRDC funded Southern Region Pulse Agronomy Project. These compare crop-top timing on yield and grain weight of genotypes representing a range of maturity profiles with the aim of identifying cultivars better suited to this practice. Paraquat was applied at 800ml/ha, at three timings based on maturity of annual ryegrass. The standard treatment was at the ryegrass milky dough stage (the recommended timing for optimum control) and 10-14 days either side of the standard (named Early and Late). Crop management was based on district practice for each crop and location. Yields were presented as a percentage of an untreated control treatment.

Grain yield response

Yield losses from crop-topping were masked in 2007 and 2008 as crop maturity was accelerated by the hot, dry spring conditions. Longer seasons in 2009 and 2010 saw higher grain yields, and more yield differentiation between crop-topping treatments and varieties.

Figure 1. Maturity comparison of PBA Blitz (left) and CIPAL0501 (right) lentils, Melton 2010.

Field peas are generally considered the pulse most suited to crop-topping due to their relatively earlier maturity. Yield losses ranged across all varieties from 13-84% at the early timing in 2009 and 2010, and 0-28% at the standard timing.

Faba bean showed moderate suitability to crop-topping in trials in 2009, with up to 49% yield loss at the early timing and only one variety showing significant yield loss at the standard crop-top timing.

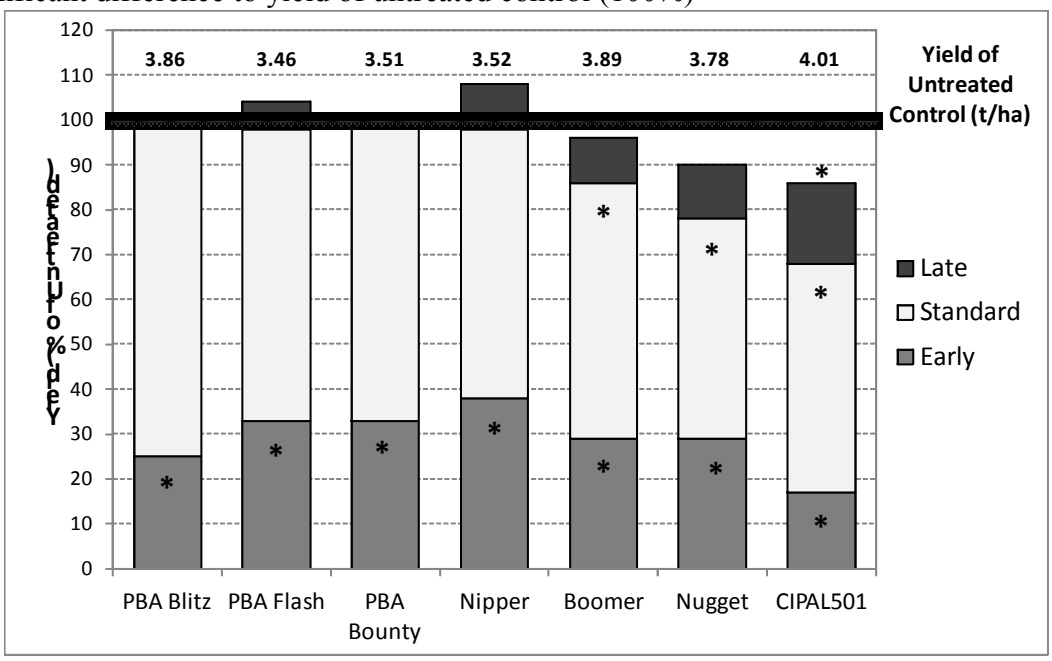
Chickpea showed the highest yield losses of the four pulse crops tested, and are generally considered unsuited to crop-topping. All chickpea varieties showed significant yield loss at the

early crop-top timing (48-83%), and up to 44% at the standard timing. There was generally no yield loss at the late timing in these crops.

Crop-topping can also reduce seed size of chickpea, which may influence profitability, with premiums paid for larger seed of kabuli chickpea. Grain weight of all varieties were reduced by crop-topping at the standard timing, while only half showed a reduction in grain weight at the early timing. The large seeded and late maturing kabuli Genesis114 also showed a reduction in grain weight at the latest timing. Promising Pulse Breeding Australia breeding lines have been identified which may offer improved suitability to this practice in chickpeas.

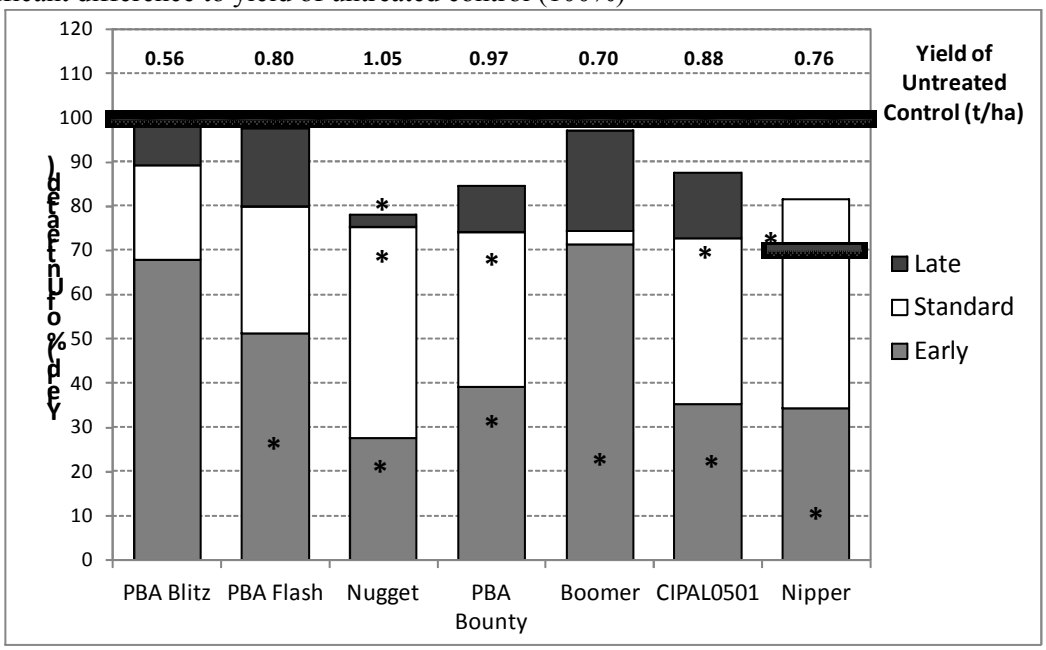
All lentil varieties displayed yield loss at the early timing in crop-topping trials at Melton (MRZ, Yorke Peninsula SA) in 2009 and 2010. Yield losses averaged 64% and 15% at the early and standard timings in 2009, and 69% and 4%, respectively, in 2010.
Most varieties showed some yield loss at the standard timing in 2009, while in 2010 significant yield losses were only observed in the later maturing varieties Nugget, Boomer, and CIPAL0501, the latter also showing yield loss at the late crop-top timing (Figure 2).

Figure 2. Effect of crop-top timing on grain yield of lentil varieties, Melton 2010. Varieties are ranked according to their visual maturity rating from earliest (left) to latest (right).
* = significant difference to yield of untreated control (100%)



A similar trial at Curyo (Low Rainfall Zone, Southern Mallee Victoria) in 2010 showed PBA Blitz to be better suited to this practice than other varieties and lines in this trial. It showed no significant yield loss at the early crop-top timing (Figure 3), whilst yield loss averaged 54% across all varieties at this timing. At the standard timing only Nugget, PBA Bounty and 2 breeding lines showed a significant yield loss, with Nugget and Nipper showing yield loss at the late crop-top timing.

Figure 3. Effect of crop-top timing on grain yield of lentil varieties, Curyo 2010. Varieties are ranked according to their visual maturity rating from earliest (left) to latest (right).
* = significant difference to yield of untreated control (100%)



Quality implications

In terms of grain quality, crop-topping may be associated with grain quality issues such as green kernel, field mould and discolouration. Green kernel is thought to be caused by a disruption to the maturation process through events such as extreme heat or poor crop-top or desiccation timing and will impact on the marketability of the grain. Preliminary work has been conducted on grain from the 2011 trials to investigate the effect of this practice on the occurrence of mould. These results have shown there was no effect of crop-top timing on the incidence of mould in lentil, however in chickpeas and field peas higher levels of mould were detected in the early crop topping treatment compared to all other treatments regardless of variety used (Table 1). This suggests that the stage of plant maturity at the time of crop-topping or the duration of the interval between topping and harvest may be linked to the incidence of mould in some pulses. This finding could have implications when crop-topping paddocks with varying levels of crop maturity due to variable soil types. Work is ongoing to confirm these findings.

Table 1: Effect of crop-topping timing on incidence of mould (# infected seeds/sample) on chickpea and lentil seed at Melton and field pea at Balaklava, 2011.

Crop/Timing	Nil	Early	Standard	Late	LSD (0.05)
Chickpea	7.1	25.8	4.4	2	7.9
Lentil	0.67	0.6	0.9	0.53	NS
Field pea	3.88	10	3	5	3.7

Summary

Earlier maturing varieties and breeders lines generally showed less yield loss than later maturing lines, however factors that affect crop maturity, such as sowing time, moisture availability and season length will also greatly influence yield losses from crop-topping. These are all important factors to consider when determining optimum crop-top timing. Preliminary work indicates that poor crop-top timing may have an impact on seed quality in some pulses, and further investigations are underway in this area.

Acknowledgements

GRDC for kindly funding this research and the SARDI Clare team for helping with trial management: Stuart Sherriff, John Nairn, Rowan Steele and Peter Maynard

APOLOGIES FROM THE EDITOR

This newsletter is rather thin. I have been in India and have only recently returned and Alison is on leave.

The India visit has been remarkably informative and I hope to have permission and details of those who conducted a most interesting trial at the Directorate of Wheat Research at Karnal. William Farrer used Indian varieties for their 'earliness' and I believe this has continued to be major importance in our wheat varieties. It has implications for our other crops. Apart for the maturity, there are important developments in understanding aluminium at high pH and they have elevated levels of boron. Sound Familiar